

7. *LEGENERE LIMOSA* (LEGENERE)

a. Description and Taxonomy

Taxonomy.—Greene (1890) originally published the scientific name *Howellia limosa* for legenera. He gave the type locality only as “the lower Sacramento” (Greene 1890:81). Based on label information from Greene’s collections, the type locality has been further described as “Fields of the lower Sacramento Valley near Elmira, Solano County, California” (McVaugh 1943:14). McVaugh (1943) determined that this species differed sufficiently from *Howellia* to be transferred to a new genus, *Legenere*. Thus, the currently accepted name for this species is *Legenere limosa*. *Legenere* is the only species in its genus (Morin 1993), which is in the bellflower family (Campanulaceae). Another common name for this species is Greene’s legenera (Morin and Niehaus 1977, Holland 1984).

Description and Identification.—*Legenere limosa* is an inconspicuous annual. The entire plant is hairless. The main stems are 10 to 30 centimeters (3.9 to 11.8 inches) long and decumbent, although any branches are erect. Extra roots often arise from the lower nodes. The leaves, which are produced underwater, are 1 to 3 centimeters (0.4 to 1.2 inches) long and narrowly triangular; they fall off the plant before flowers appear. The egg-shaped or oval bracts are 6 to 12 millimeters (0.24 to 0.47 inch) long and remain throughout the flowering period. A single flower arises above each bract. *Legenere limosa* flowers may or may not have corollas, and a single plant can produce both types of flowers. When present, the corollas are white or yellowish, 3.5 to 4 millimeters (0.14 to 0.16 inch) long, and two-lipped. The upper two corolla lobes are narrower than the lower three, and the corolla tube is slit on the upper side. The stamens are joined to form a tubular structure. The flower stalks are very slender and elongate as the fruit matures, reaching a final length of as much as 3 centimeters (1.2 inches). *Legenere limosa* has a cylindrical capsule 6 to 10 millimeters (0.24 to 0.39 inch) long, which splits open only at the tip. Each capsule contains up to 20 seeds, which are about 1 millimeter (0.04 inch) long, brown, smooth, and shiny (McVaugh 1943, Mason 1957, Abrams and Ferris 1960, Holland 1984, Morin 1993). The chromosome number of *L. limosa* has not been determined.

The genera most likely to be confused with *Legenere limosa* are *Howellia*, *Downingia*, *Lobelia*, and *Porterella*. Both *Howellia* and *Downingia* have capsules that split along the sides, whereas the capsule of *L. limosa* opens at the tip. Moreover, *Downingia* flowers are not stalked. The *Lobelia* species in California have either red or blue flowers and spherical fruits, as opposed to the whitish flowers and cylindrical fruits of *L. limosa*. *Porterella* has showy blue flowers with yellow or white marks at the base of the corolla lobes, and it occurs

at higher elevations than *L. limosa* (Morin and Niehaus 1977, Holland 1984, Morin 1993).

b. Historical and Current Distribution

Historical Distribution.—Between 1890 and 1984, *Legenere limosa* had been reported from 12 sites in 8 counties encompassing 6 vernal pool regions. The historical counties of occurrence were Solano (three sites, including the type locality), Lake and Sacramento (two sites each), and Napa, Placer, San Mateo, Sonoma, and Stanislaus Counties (one site each) (Hoover 1937, Mason 1957, Rubtzoff and Heckard 1975, Holland 1984) (**Figure II-29**). These sites were located in the Central Coast, Lake-Napa, Santa Rosa, Solano-Colusa, Southeastern Sacramento Valley, and Southern Sierra Foothills vernal pool regions (Keeler-Wolf *et al.* 1998). As of 1984 the only three populations believed to remain extant were in Napa, Placer, and Sacramento Counties (Holland 1984).

Current Distribution.—Since 1984, *Legenere limosa* has been rediscovered at several historical sites and has been found at numerous new locations. During that same time period, the type locality and six other occurrences were extirpated. Among the 52 occurrences presumed to be extant, 20 are in Sacramento County, including 9 in the vicinity of Elk Grove and 6 in the vicinity of the former Mather Air Force Base. Another area of concentration, with 11 extant occurrences, is near Dozier in Solano County. Other counties where this species is presumed to remain are Alameda, Santa Clara, Sonoma, Lake, Napa, Placer, San Joaquin, San Mateo, Shasta, Tehama, and Yuba (Skinner and Pavlik 1994, W. Legard *in litt.* 2005, Platenkamp *in litt.* 2005, California Natural Diversity Data Base 2005). The vernal pool regions (Keeler-Wolf *et al.* 1998) where *Legenere limosa* remains extant are Lake-Napa, Northeastern Sacramento Valley, Northwestern Sacramento Valley, Santa Rosa, Solano-Colusa, and Southeastern Sacramento Valley. It has been extirpated from the Southern Sierra Foothills Vernal Pool Region. Please refer to the Draft Santa Rosa Plains Recovery Plan (in development) for information regarding occurrences within the Santa Rosa Vernal Pool Region, as identified by Keeler-Wolf *et al.* (1998). The Central Coast Vernal Pool Region occurrence, in San Mateo County, has not been rediscovered since 1906 but is presumed to be extant because suitable habitat remains in the area (California Natural Diversity Data Base 2001).

c. Life History and Habitat

Reproduction and Demography.—*Legenere limosa* seeds germinate between late February and April. The specific conditions necessary for seed germination are unknown. The plants grow through the standing water; as the

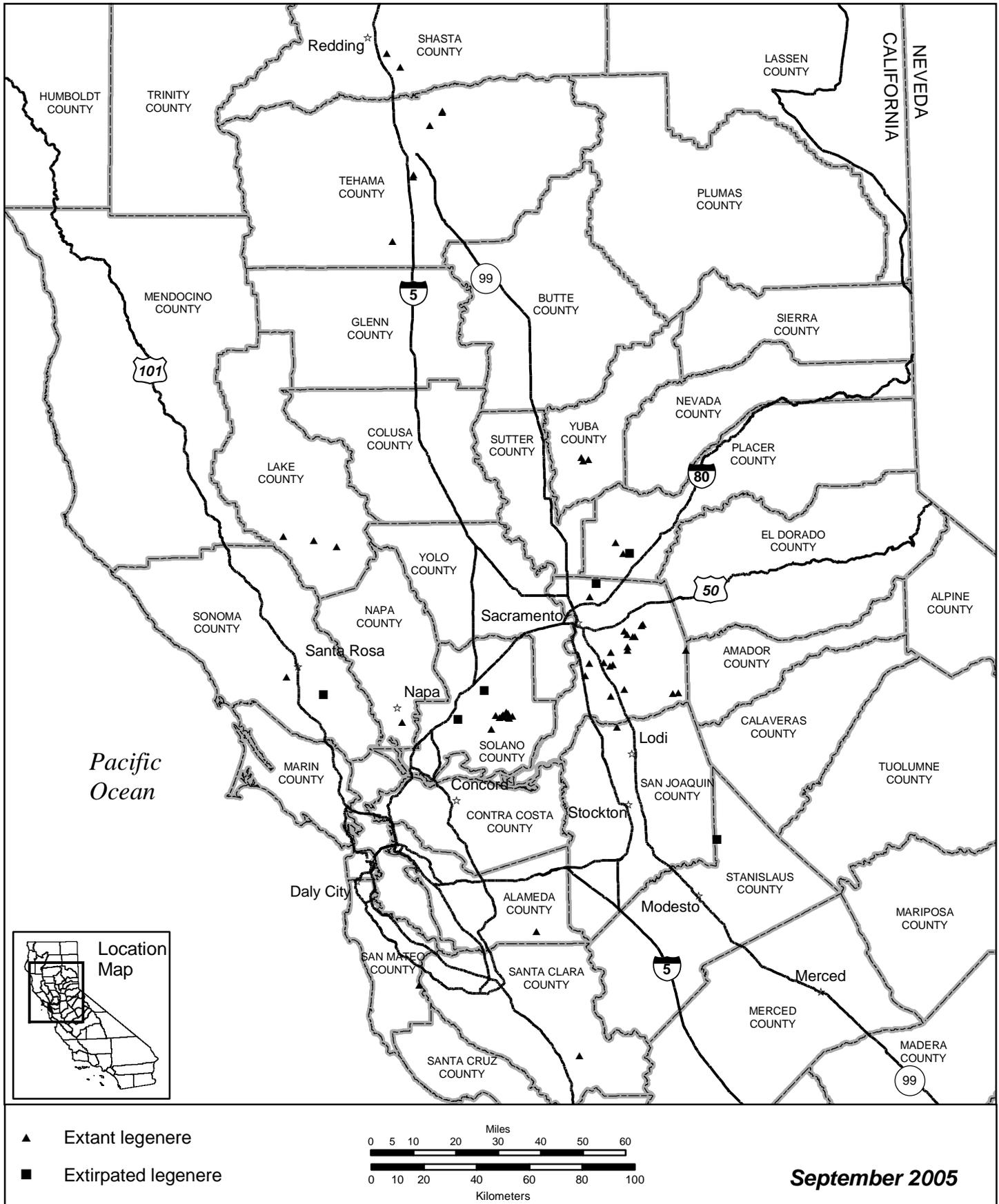


Figure II-29. Distribution of *Legenere limosa* (legenere).

water evaporates or recedes, *L. limosa* stems may collapse onto the lake bottom or become caught on taller, stronger plants (Holland 1984). *L. limosa* flowers during April, May, or June (Morin and Niehaus 1977, Holland 1984, Skinner and Pavlik 1994). Pollination in *L. limosa* has not been studied, but the small, inconspicuous flowers suggest that it may be self-pollinated (Holland 1984). By late June, each plant typically produces 6 to 10 capsules containing several hundred seeds each. Seed dispersal agents are unknown but may include gravity, water, and waterfowl. Most populations contain densities of less than one plant per square meter (10.8 square feet) (Holland 1984). The presence of *Legenere limosa* is even more variable than other vernal pool annuals; entire populations have disappeared for decades, then reappeared (Holland 1984, California Natural Diversity Data Base 2001). Thus, a persistent soil seed bank most likely exists. Survival rates and other aspects of demography have not been investigated.

Habitat and Community Associations.—*Legenere limosa* grows in a variety of habitats including vernal pools, vernal marshes, artificial ponds, and floodplains of intermittent streams. Occupied vernal pool types include Northern Basalt Flow, Northern Claypan, Northern Hardpan, Northern Volcanic Ashflow, and Northern Volcanic Mudflow (Sawyer and Keeler-Wolf 1995). The surrounding plant community may be grassland, open woodland, or hardwood forest containing *Quercus* species (oaks) or *Aesculus californica* (California buckeye). At one site, *L. limosa* grows in both a vernal pool and the adjacent grassland (California Natural Diversity Data Base 2001). The vernal pools and lakes supporting *L. limosa* vary in size from about 4 square meters (43 square feet) to 41 hectares (100 acres) (Holland 1984, California Natural Diversity Data Base 2001). When it occurs in large pools and vernal lakes, *L. limosa* grows only in the shallower areas (less than 20 centimeters [8 inches] deep) (Holland 1984). Substrates in occupied areas may have been deposited by streams or volcanic flows. Soils underlying the pools themselves typically are shallow, acidic clays with few stones (Holland 1984). *Legenere limosa* has been reported from elevations ranging from 3 meters (10 feet) in Solano County to 1,024 meters (3,360 feet) in Alameda County (California Natural Diversity Data Base 2005).

Legenere limosa occurs most often with *Lasthenia glaberrima* and *Eleocharis macrostachya*, and to a lesser extent with *Gratiola heterosepala* and *Downingia pusilla*. In addition to *Gratiola heterosepala*, other plants in this recovery plan that co-occur with *Legenere limosa* are *Navarretia leucocephala* ssp. *plieantha*, and *Orcuttia tenuis* (California Natural Diversity Data Base 2005).

d. Reasons for Decline and Threats to Survival

Most species addressed in this recovery plan are threatened by similar factors because they occupy the same vernal pool ecosystems. These general threats,

faced by all the covered species, are discussed in greater detail in the Introduction section of this recovery plan. Additional, specific threats to *Legenere limosa* are described below.

Of the six occurrences of *Legenere limosa* known to be extirpated, two were destroyed by conversion to agriculture, one by changes in hydrology, two by urban development, and one by unknown causes (Holland 1984, California Natural Diversity Data Base 2005). Several sites where the species still occurs have been degraded by discing or other agricultural practices, inappropriate livestock grazing, dirt biking, and trash dumping (California Natural Diversity Data Base 2005). The San Mateo County site has been subjected to logging and hydrological changes; *L. limosa* has not been observed there in over 90 years (Holland 1984). *Legenere limosa* occurred at Boggs Lake in the 1950's but has not been seen there since (Rubtzoff and Heckard 1975, Holland 1984, California Natural Diversity Data Base 2005), even though suitable habitat remains.

About one-third of the extant occurrences of *Legenere limosa* are in areas slated for commercial or residential development (Holland 1984, California Natural Diversity Data Base 2005). In fact, some of the populations extant in 1983 already may have been destroyed by development, but they have not been visited since that time. More than one-third of populations are subject to livestock grazing (California Natural Diversity Data Base 2005), but few appear to be declining. Holland (1984) indicated that “light” grazing during the winter and early spring did not seem to be detrimental to *L. limosa*. Competition from *Phyla nodiflora* is a threat at one Solano County site (California Natural Diversity Data Base 2005). If insects are involved in pollinating *L. limosa*, a decline in insect populations poses a potential threat.

e. Conservation Efforts

Legenere limosa has no Federal or State status. It has been included on California Native Plant Society lists of rare and endangered species for 25 years (Powell 1974) and is currently on List 1B because it is “endangered throughout its range” (Tibor 2001).

Holland (1984) conducted a status survey of *Legenere limosa* in 1983 with funding from the County of Sacramento, R.C. Fuller Associates, and The Nature Conservancy. He confirmed that several historical populations no longer persisted. New populations of this species were discovered during pre-project surveys and during searches by Nature Conservancy volunteers (Holland 1984, California Natural Diversity Data Base 2005).

Eighteen occurrences of *Legenere limosa* are (or were) on nature preserves or publicly-owned lands. Five occurrences are known currently from the Jepson Prairie Preserve in Solano County, two from the nearby Calhoun Cut Ecological Reserve, and two from the Dales Lake Ecological Reserve. *Legenere limosa* was known from Boggs Lake before the preserve was established, but it has not been rediscovered in that area for over 40 years (Holland 1984). *Legenere limosa* occurs in abundance in several vernal pools on the Valensin Ranch Property in Sacramento County owned and managed by The Nature Conservancy (J. Marty, unpub.data). A population of *L. limosa* was also discovered in a restored pool on Beale Air Force Base in Yuba County, California (J. Marty, unpub. data.). Two occurrences, at Hog Lake and on the Stillwater Plains, are on property administered by the U.S. Bureau of Land Management. Sacramento County owns land supporting three occurrences of *L. limosa*; one is at a wastewater treatment plant, and the other two are in county parks. Finally, one occurrence is on land owned by the Sacramento Municipal Utility District (California Natural Diversity Data Base 2001). However, mere occurrence on public land is not a guarantee of protection. Only the preserves and the U.S. Bureau of Land Management occurrences are managed to promote the continued existence of *L. limosa* and other rare species. As of 1991, one Sacramento County developer had plans to preserve several pools containing *L. limosa* when he developed the property (California Natural Diversity Data Base 2001).

8. *MYOSURUS MINIMUS* SSP. *APUS* (LITTLE MOUSETAIL)

a. Description and Taxonomy

Taxonomy.—Little mousetail was first named by Greene (1885) as *Myosurus minimus* var. *apus*. The type specimen of little mousetail was collected “from the table-lands back of San Diego” (Greene 1885:277). Campbell (1952) changed the rank of little mousetail from a variety to a subspecies, resulting in the new combination *Myosurus minimus* ssp. *apus*, which is in use today. This subspecies is believed to have originated as a hybrid between *Myosurus minimus* ssp. *filiformis* (thread-like mousetail) and *Myosurus sessilis* (sessile mousetail); *Myosurus minimus* var. *apus* is now self-perpetuating and therefore worthy of recognition as a separate taxon (Mason 1957, Stone 1959). However, *Myosurus minimus* var. *apus* may cross with *Myosurus sessilis* or with other mousetails and the hybrids then may interbreed again, resulting in a series of intermediates that are difficult to identify (Campbell 1952, Stone 1959) and that may not warrant taxonomic recognition (A. Whittemore *in litt.* 1993). Mousetails are members of the buttercup family (Ranunculaceae).

Description and Identification.—*Myosurus minimus* ssp. *apus* (Figure II-30) is a tiny, tufted annual lacking showy flowers. Both the leaves and